

MBI-0032.ST25.txt
SEQUENCE LISTING

<110> Broun, Pierre
<120> Method for Modifying a Biosynthetic Pathway
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<170> PatentIn version 3.0
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Leu Ser Ile Ser Thr Thr Pro Lys Pro Thr Thr Thr Thr Glu Lys Lys
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ctc tct tct ccg ccg gcg acg tcg atg cgt ctc tac aga atg gga agc     146
Leu Ser Ser Pro Pro Ala Thr Ser Met Arg Leu Tyr Arg Met Gly Ser
              35             40             45

ggc gga agc agc gtc gtt ttg gat tca gag aac ggc gtc gag acc gag     194
Gly Gly Ser Ser Val Val Leu Asp Ser Glu Asn Gly Val Glu Thr Glu
              50             55             60

tca cgt aag ctt cct tcg tcg aaa tat aaa ggc gtt gtg cct cag cct     242
Ser Arg Lys Leu Pro Ser Ser Lys Tyr Lys Gly Val Val Pro Gln Pro
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Ala Val Arg Arg Phe Arg Gly Arg Asp Ala Val Thr Asn Phe Lys Ser
              115            120            125

caa gtt gat gga aac gac gcc gaa tcg gct ttt ctt gac gct cat tct     434
Gln Val Asp Gly Asn Asp Ala Glu Ser Ala Phe Leu Asp Ala His Ser
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ccg gcg atg acg acg gcg atg ggg atg aat ccg tct ccg acg aaa ggc Pro Ala Met Thr Thr Ala Met Gly Met Asn Pro Ser Pro Thr Lys Gly 225 230 235	722
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 35 40 45

Gly Ser Ser Val Val Leu Asp Ser Glu Asn Gly Val Glu Thr Glu Ser
 50 55 60

Arg Lys Leu Pro Ser Ser Lys Tyr Lys Gly Val Val Pro Gln Pro Asn
 65 70 75 80

Gly Arg Trp Gly Ala Gln Ile Tyr Glu Lys His Gln Arg Val Trp Leu
 85 90 95

Gly Thr Phe Asn Glu Glu Glu Glu Ala Ala Ser Ser Tyr Asp Ile Ala
 100 105 110

Val Arg Arg Phe Arg Gly Arg Asp Ala Val Thr Asn Phe Lys Ser Gln
 115 120 125

Val Asp Gly Asn Asp Ala Glu Ser Ala Phe Leu Asp Ala His Ser Lys
 130 135 140

Ala Glu Ile Val Asp Met Leu Arg Lys His Thr Tyr Ala Asp Glu Phe
 145 150 155 160

Glu Gln Ser Arg Arg Lys Phe Val Asn Gly Asp Gly Lys Arg Ser Gly
 165 170 175

Leu Glu Thr Ala Thr Tyr Gly Asn Asp Ala Val Leu Arg Ala Arg Glu
 180 185 190

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Val Leu Phe Glu Lys Thr Val Thr Pro Ser Asp Val Gly Lys Leu Asn
195 200 205

Arg Leu Val Ile Pro Lys Gln His Ala Glu Lys His Phe Pro Leu Pro
210 215 220

Ala Met Thr Thr Ala Met Gly Met Asn Pro Ser Pro Thr Lys Gly Val
225 230 235 240

Leu Ile Asn Leu Glu Asp Arg Thr Gly Lys Val Trp Arg Phe Arg Tyr
245 250 255

Ser Tyr Trp Asn Ser Ser Gln Ser Tyr Val Leu Thr Lys Gly Trp Ser
260 265 270

Arg Phe Val Lys Glu Lys Asn Leu Arg Ala Gly Asp Val Val Cys Phe
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Glu Arg Ser Thr Gly Pro Asp Arg Gln Leu Tyr Ile His Trp Lys Val
290 295 300

Arg Ser Ser Pro Val Gln Thr Val Val Arg Leu Phe Gly Val Asn Ile
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Phe Asn Val Ser Asn Glu Lys Pro Asn Asp Val Ala Val Glu Cys Val
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Met Asp	
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ttt gac gag gag cta aat ctt tgt att acg aaa ggt aaa aat gtt gat	164
Phe Asp Glu Glu Leu Asn Leu Cys Ile Thr Lys Gly Lys Asn Val Asp	
5 10 15	
cat tct ttt gga gga gaa gct tct tcc acg tcc cca aga tct atg aag	212
His Ser Phe Gly Gly Glu Ala Ser Ser Thr Ser Pro Arg Ser Met Lys	
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aaa atg aag agt cct agt cgt cct aaa ccc tat ttc caa tcc tct tct	260
Lys Met Lys Ser Pro Ser Arg Pro Lys Pro Tyr Phe Gln Ser Ser Ser	
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Ser Pro Tyr Ser Leu Glu Ala Phe Pro Phe Ser Leu Asp Pro Thr Leu	
55 60 65	
cag aat cag caa caa caa ctc gga tca tac gtt ccg gta ctt gag caa	356
Gln Asn Gln Gln Gln Leu Gly Ser Tyr Val Pro Val Leu Glu Gln	
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cga caa gac ccg aca atg caa ggc cag aag caa atg atc tcc ttt agt	404
Arg Gln Asp Pro Thr Met Gln Gly Gln Lys Gln Met Ile Ser Phe Ser	
85 90 95	
cct caa caa caa caa cag cag cag cag tat atg gcc cag tac tgg agt	452
Pro Gln Gln Gln Gln Gln Gln Gln Tyr Met Ala Gln Tyr Trp Ser	
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gac aca ttg aat ctg agt cca aga gga aga atg atg atg atg atg agc	500
Asp Thr Leu Asn Leu Ser Pro Arg Gly Arg Met Met Met Met Met Ser	
115 120 125 130	
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Gln Glu Ala Val Gln Pro Tyr Ile Ala Thr Lys Leu Tyr Arg Gly Val	
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aga caa cgt caa tgg gga aaa tgg gtc gca gag atc cgt aag cca cga	596
Arg Gln Arg Gln Trp Gly Lys Trp Val Ala Glu Ile Arg Lys Pro Arg	
150 155 160	
agc agg gca cgt ctt tgg ctt ggt acc ttt gat aca gct gaa gaa gct	644
Ser Arg Ala Arg Leu Trp Leu Gly Thr Phe Asp Thr Ala Glu Glu Ala	
165 170 175	
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Ala Met Ala Tyr Asp Arg Gln Ala Phe Lys Leu Arg Gly His Ser Ala	
180 185 190	
aca ctg aat ttc ccg gag cat ttt gtg aat aag gaa agc gag ctg cat	740
Thr Leu Asn Phe Pro Glu His Phe Val Asn Lys Glu Ser Glu Leu His	
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gat tca aac tcg tcg gat cag aaa gaa cct gaa acg cca cag cca agc	788
Asp Ser Asn Ser Ser Asp Gln Lys Glu Pro Glu Thr Pro Gln Pro Ser	
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Glu Val Asn Leu Glu Ser Lys Glu Leu Pro Val Ile Asp Val Gly Arg
230 235 240

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Glu Glu Gly Met Ala Glu Ala Trp Tyr Asn Ala Ile Thr Ser Gly Trp
245 250 255

ggt cct gaa agt cct ctt tgg gat gat ttg gat agt tct cat cag ttt 932
Gly Pro Glu Ser Pro Leu Trp Asp Asp Leu Asp Ser Ser His Gln Phe
260 265 270

tca tca gaa agc tca tct tct tct cct ctc tct tgt cct atg agg cct 980
Ser Ser Glu Ser Ser Ser Ser Pro Leu Ser Cys Pro Met Arg Pro
275 280 285 290

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Phe Phe

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tatcagtcac tatatgtgtc taccttttct ctgtatttct atcattatca ttgtttttat 1149

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35 40 45

Ser Ser Ser Pro Tyr Ser Leu Glu Ala Phe Pro Phe Ser Leu Asp Pro
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Thr Leu Gln Asn Gln Gln Gln Leu Gly Ser Tyr Val Pro Val Leu
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Glu Gln Arg Gln Asp Pro Thr Met Gln Gly Gln Lys Gln Met Ile Ser
85 90 95

Phe Ser Pro Gln Gln Gln Gln Gln Gln Gln Tyr Met Ala Gln Tyr
100 105 110

Trp Ser Asp Thr Leu Asn Leu Ser Pro Arg Gly Arg Met Met Met Met
115 120 125

Met Ser Gln Glu Ala Val Gln Pro Tyr Ile Ala Thr Lys Leu Tyr Arg
130 135 140

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145 150 155 160

Pro Arg Ser Arg Ala Arg Leu Trp Leu Gly Thr Phe Asp Thr Ala Glu
165 170 175

Glu Ala Ala Met Ala Tyr Asp Arg Gln Ala Phe Lys Leu Arg Gly His
180 185 190

Ser Ala Thr Leu Asn Phe Pro Glu His Phe Val Asn Lys Glu Ser Glu
195 200 205

Leu His Asp Ser Asn Ser Ser Asp Gln Lys Glu Pro Glu Thr Pro Gln
210 215 220

Pro Ser Glu Val Asn Leu Glu Ser Lys Glu Leu Pro Val Ile Asp Val
225 230 235 240

Gly Arg Glu Glu Gly Met Ala Glu Ala Trp Tyr Asn Ala Ile Thr Ser
245 250 255

Gly Trp Gly Pro Glu Ser Pro Leu Trp Asp Asp Leu Asp Ser Ser His
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Arg Pro Phe Phe
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Met Glu Arg Asp Asp Cys Arg Arg
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ttt cag gac tcg ccg gcg cag acg acg gag aga aga gtg aaa tat aaa 160
Phe Gln Asp Ser Pro Ala Gln Thr Thr Glu Arg Arg Val Lys Tyr Lys
10 15 20

cca aag aag aaa aga gcc aaa gat gat gat gat gag aaa gtt gtt tcg 208
Pro Lys Lys Lys Arg Ala Lys Asp Asp Asp Asp Glu Lys Val Val Ser
25 30 35 40

aag cat cca aat ttt cga ggt gtc aga atg aga caa tgg gga aaa tgg 256
Lys His Pro Asn Phe Arg Gly Val Arg Met Arg Gln Trp Gly Lys Trp
45 50 55

gtg tcc gaa atc aga gag cca aaa aag aaa tca aga atc tgg ctc ggt 304
Val Ser Glu Ile Arg Glu Pro Lys Lys Lys Ser Arg Ile Trp Leu Gly
60 65 70

act ttc tcc acg gcg gag atg gcg gcg cgt gct cac gac gtg gca gct 352
Thr Phe Ser Thr Ala Glu Met Ala Ala Arg Ala His Asp Val Ala Ala
75 80 85

tta gcc atc aaa ggc ggt tct gca cat ctc aac ttc ccg gag ctc gct 400
Leu Ala Ile Lys Gly Gly Ser Ala His Leu Asn Phe Pro Glu Leu Ala
90 95 100

tat cac ctc cct aga cca gct agt gcc gac cct aaa gac atc caa gct 448
Tyr His Leu Pro Arg Pro Ala Ser Ala Asp Pro Lys Asp Ile Gln Ala
105 110 115 120

gcc gcc gcc gca gct gca gcc gct gtg gcc att gac atg gat gta gag 496
Ala Ala Ala Ala Ala Ala Ala Ala Val Ala Ile Asp Met Asp Val Glu
125 130 135

acg tct tcg ccg tcg cca tct ccc aca gtt acg gaa acg tca tct ccg 544
Thr Ser Ser Pro Ser Pro Ser Pro Thr Val Thr Glu Thr Ser Ser Pro
140 145 150

gct atg ata gca ctc tcc gac gac gcg ttc tcc gat ctt cct gat ctc 592
Ala Met Ile Ala Leu Ser Asp Asp Ala Phe Ser Asp Leu Pro Asp Leu
155 160 165

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Leu Leu Asn Val Asn His Asn Ile Asp Gly Phe Trp Asp Ser Phe Pro
170 175 180

tat gaa gaa ccc ttc ctc tct caa agt tac tag aaactcaaaa ctatgtcgtt 693
Tyr Glu Glu Pro Phe Leu Ser Gln Ser Tyr

185 190
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 20 25 30

Asp Asp Asp Glu Lys Val Val Ser Lys His Pro Asn Phe Arg Gly Val
 35 40 45

Arg Met Arg Gln Trp Gly Lys Trp Val Ser Glu Ile Arg Glu Pro Lys
 50 55 60

Lys Lys Ser Arg Ile Trp Leu Gly Thr Phe Ser Thr Ala Glu Met Ala
 65 70 75 80

Ala Arg Ala His Asp Val Ala Ala Leu Ala Ile Lys Gly Gly Ser Ala
 85 90 95

His Leu Asn Phe Pro Glu Leu Ala Tyr His Leu Pro Arg Pro Ala Ser
 100 105 110

Ala Asp Pro Lys Asp Ile Gln Ala Ala Ala Ala Ala Ala Ala Ala
 115 120 125

Val Ala Ile Asp Met Asp Val Glu Thr Ser Ser Pro Ser Pro Ser Pro
 130 135 140

Thr Val Thr Glu Thr Ser Ser Pro Ala Met Ile Ala Leu Ser Asp Asp
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Ala Phe Ser Asp Leu Pro Asp Leu Leu Leu Asn Val Asn His Asn Ile
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1 5 10 15

atg cag tca aag tac aaa gga gtg agg aag agg aaa tgg gga aaa tgg 154
Met Gln Ser Lys Tyr Lys Gly Val Arg Lys Arg Lys Trp Gly Lys Trp
20 25 30

gta tcg gag atc aga ctt cca cac agc aga gaa cga att tgg tta ggc 202
Val Ser Glu Ile Arg Leu Pro His Ser Arg Glu Arg Ile Trp Leu Gly
35 40 45

tct tac gac act ccc gag aag gcg gcg cgt gct ttc gac gcc gct caa 250
Ser Tyr Asp Thr Pro Glu Lys Ala Ala Arg Ala Phe Asp Ala Ala Gln
50 55 60

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Phe Cys Leu Arg Gly Gly Asp Ala Asn Phe Asn Phe Pro Asn Asn Pro
65 70 75 80

ccg tcg atc tcc gta gaa aag tcg ttg acg cct ccg gag att cag gaa 346
Pro Ser Ile Ser Val Glu Lys Ser Leu Thr Pro Pro Glu Ile Gln Glu
85 90 95

gct gct gct aga ttc gct aac aca ttc caa gac att gtc aag gga gaa 394
Ala Ala Ala Arg Phe Ala Asn Thr Phe Gln Asp Ile Val Lys Gly Glu
100 105 110

gaa gaa tcg ggt tta gta ccc gga tcc gag atc cga cca gag tct cct 442
Glu Glu Ser Gly Leu Val Pro Gly Ser Glu Ile Arg Pro Glu Ser Pro
115 120 125

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130 135 140

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gac ttc tct ggc ttc tcc ggt ggt gat cga ttt aca gag att tta ccc      586
Asp Phe Ser Gly Phe Ser Gly Gly Asp Arg Phe Thr Glu Ile Leu Pro
                      165                      170                      175

atc gaa gat tac gga gga gag agt tta tta gat gaa tct ttg att ctt      634
Ile Glu Asp Tyr Gly Gly Glu Ser Leu Leu Asp Glu Ser Leu Ile Leu
                      180                      185                      190

tgg gat ttt tga attcccaaac ataatatattt tttagagcga actgtgagat      686
Trp Asp Phe
                      195

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ggaattttcctt tcgttttcgga tccgaatttg atgtggatca tattcacacc tatatttttt      806

cattttttttg ttgtaaagaa aaatcggata agattctagt aataaatgtt aaaagtccat      866

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35                      40                      45

Ser Tyr Asp Thr Pro Glu Lys Ala Ala Arg Ala Phe Asp Ala Ala Gln
50                      55                      60

Phe Cys Leu Arg Gly Gly Asp Ala Asn Phe Asn Phe Pro Asn Asn Pro
65                      70                      75                      80

Pro Ser Ile Ser Val Glu Lys Ser Leu Thr Pro Pro Glu Ile Gln Glu
85                      90                      95

Ala Ala Ala Arg Phe Ala Asn Thr Phe Gln Asp Ile Val Lys Gly Glu
100                      105                      110

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Glu Glu Ser Gly Leu Val Pro Gly Ser Glu Ile Arg Pro Glu Ser Pro
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Ser Thr Ser Ala Ser Val Ala Thr Ser Thr Val Asp Tyr Asp Phe Ser
130 135 140

Phe Leu Asp Leu Leu Pro Met Asn Phe Gly Phe Asp Ser Phe Ser Asp
145 150 155 160

Asp Phe Ser Gly Phe Ser Gly Gly Asp Arg Phe Thr Glu Ile Leu Pro
165 170 175

Ile Glu Asp Tyr Gly Gly Glu Ser Leu Leu Asp Glu Ser Leu Ile Leu
180 185 190

Trp Asp Phe
195